

WHAT IS CLAIMED IS:

1. A vehicle wheel bearing apparatus for a wheel of vehicle comprising:
  - an axle housing supported under a body of a vehicle;
  - a hollow drive shaft inserted into the axle housing;
  - a wheel bearing arranged between the drive shaft and an opening of the axle housing and structured as a unit of a wheel hub and a double row rolling bearing;
  - the wheel bearing comprising:
    - an inner member including a wheel hub integrally formed with a wheel mounting flange on one end and an axially extending cylindrical portion;
    - at least one inner ring press-fit onto the cylindrical portion of the wheel hub and said at least one inner ring with at least one inner raceway surface formed on its outer circumferential surface;
    - an outer member arranged around the inner member and formed with double row outer raceway surfaces on its inner circumferential surface opposite to the inner raceway surfaces;
    - double row rolling elements arranged between the inner and outer raceway surfaces of the inner member and the outer member;
    - a cage for freely rollably holding the rolling elements;
    - seals for sealing an annular space between the inner member and the outer member; and
    - a cap having a metal core is press-fit into an end of a central bore of the wheel hub.

2. The vehicle wheel bearing apparatus of claim 1 wherein said at least one of said inner raceway surfaces is formed directly on the outer circumferential surface of the wheel hub.

3. The vehicle wheel bearing apparatus of claim 1 wherein the end of said cylindrical portion is plastically deformed radially outward to form a caulked portion to prevent the inner ring from slipping off of the cylindrical portion of the wheel hub.

4. The vehicle wheel bearing apparatus of claim 3 wherein the outer circumferential region of the wheel mounting flange from its base of an inboard side to the cylindrical portion is hardened by high frequency induction hardening to have a surface hardness of 54~64 HRC, and the caulked portion remains unhardened to have a surface hardness of 25 HRC or less after forging.

5. The vehicle wheel bearing apparatus of claim 1 wherein said cap is press-fit into a central bore of the wheel mounting flange of wheel hub.

6. The vehicle wheel bearing apparatus of claim 1 wherein said cap comprises a metal core of steel having a substantially "C" shaped configuration cross section and an elastic member attached to at least part of its fitting portion.

7. The vehicle wheel bearing apparatus of claim 6 wherein said cap is press-fit so that the circumferential edge of its fitting portion is oriented toward the outboard side.

8. The vehicle wheel bearing apparatus of claim 6 wherein said circumferential edge of the fitting portion of the metal core is formed with a radially outwardly extending bead, and an annular groove is formed on the central bore of the wheel hub to engage the bead.

9. The vehicle wheel bearing apparatus of claim 6 wherein said cap is limited against axial movement by steps provided at either sides of the cap.

10. The vehicle wheel bearing apparatus of claim 1 wherein said cap comprises a metal core having a substantially "C"-shaped configuration cross section, an annular recess is formed on the inner circumferential surface of the wheel hub, and the fitting portion of the cap is formed with a projection adapted to be engaged with the annular recess.

11. The vehicle wheel bearing apparatus of claim 10 wherein said projection is formed by plastic deformation after the cap has been press-fit into the bore of the wheel hub.

12. The vehicle wheel bearing apparatus of claim 1 wherein said cap is press-fit with an interference of 0.05~0.3 mm.